

CLAIMS:

1. An insecticidal composition which:  
(i) is adapted for oral administration to an insect,  
(ii) comprises a proteinaceous pesticidal material  
5 obtainable from a *Xenorhabdus* species, or a pesticidal  
fragment thereof, or a pesticidal variant or derivative of  
either of these,  
having in each case toxic activity when administered orally.
- 10 2. A composition according to claim 1 wherein the said  
pesticidal material comprises material encoded by the  
nucleotide sequence of Figure 2 or variant or fragment  
thereof, or a sequence which hybridises with said  
sequence.
- 15 3. A composition according to claim 1 ~~or claim 2~~ which  
comprises cells of *Xenorhabdus*.
- 20 4. A composition <sup>claim 1</sup> as claimed in ~~any one of the~~  
~~preceding claims~~ which comprises supernatant taken from  
cultures of cells of *Xenorhabdus* species.
- 25 5. A composition according to any one of the preceding  
claims wherein the *Xenorhabdus* species is *Xenorhabdus*  
*nematophilus*.
- 30 6. A composition according to <sup>claim 1</sup> ~~any one of claims 1 to 4~~  
wherein the *Xenorhabdus* species is ATCC 19061, NCIMB  
40886 or NCIMB 40887.
- 35 7. A composition as claimed in <sup>claim 1</sup> ~~any one of the preceding~~  
~~claims~~ which comprises a further pesticidal material not  
obtainable from *Xenorhabdus*.
8. A composition according to claim 7 wherein the said  
further pesticidal material comprises a material  
obtainable from *B. thuringiensis*.

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9. A composition according to claim 8 which further comprises cells of *B. thuringiensis*.

10. A composition according to claim 8 wherein the  
5 pesticidal materials obtainable from *B. thuringiensis* comprises the delta endotoxin.

*a* 11. A composition according to <sup>claim 1</sup> ~~any one of the preceding~~  
~~claims~~ which further comprises an agriculturally  
10 acceptable carrier.

*a* 12. A composition according to claim <sup>11</sup> ~~10~~ wherein the carrier comprises items of insect diet.

15 13. A method for killing or controlling insect pests, which method comprises administering to a pest or the environment thereof a composition according to any one of the preceding claims.

*a* 20 14. A method as claimed in claim <sup>13</sup> ~~12~~ wherein the pests are insects from the order Lepidoptera or Diptera.

25 15. A microorganism comprising *Xenorhabdus* strain NCIMB 40886.

16. A microorganism comprising *Xenorhabdus* strain NCIMB 40887.

30 17. A pesticidal agent which comprises a a toxin comprising a protein which is encoded by DNA which includes SEQ ID No. 1 or a variant or fragment thereof.

35 18. An isolated pesticidal agent characterised in that it is obtainable from cultures of *X. nematophilus* or mutants thereof, has oral pesticidal activity against *Pieris brassicae*, *Pieris rapae* and *Plutella xylostella*, is substantially heat stable to 55°C, is proteinaceous, acts synergistically with *B. thuringiensis* cells as an

oral pesticide, and is substantially resistant to proteolysis by trypsin and proteinase K.

19. An isolated pesticidal agent as claimed in claim 18  
5 further characterised in that the pesticidal activity is substantially destroyed by treatment with sodium dodecyl sulphate or acetone or heating to 80°C.

20. An isolated pesticidal agent as claimed in claim 18  
10 ~~or claim 19~~ further characterised in that the agent is an extracellular protein.

21. A recombinant DNA which encodes a pesticidal agent  
according to <sup>claim 17</sup> ~~any one of claims 17 to 20~~.

22. A recombinant DNA of claim 21 which comprises the sequence of Figure 2 or a variant or fragment thereof.

23. A recombinant DNA which comprises or hybridises  
20 under stringent conditions with all or part of the sequence of Figure 2, and which encodes a pesticidal material.

24. An expression vector comprising a recombinant DNA  
25 according to <sup>claim 21</sup> ~~any one of claims 21 to 23~~.

25. A host organism which has been transformed with an expression vector according to claim 24.

26. A host organism as claimed in claim 25 which has been  
30 engineered or selected such that it also expresses other pesticidal proteinaceous toxicity enhancing materials

27. A host organism comprising a nucleotide sequence  
35 coding for a fusion protein comprising a pesticidally active portion of an agent as claimed in, <sup>claim 17</sup> ~~any one of claims 17 to 20~~ in combination with other pesticidal proteinaceous toxicity enhancing materials.

28. A host organism as claimed in claim 27 wherein the pesticidal toxicity enhancing materials comprise delta-endotoxin from *B. thuringiensis*.

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29. A host organism as claimed in <sup>Claim 25</sup> ~~any one of claims 25 to 28~~ wherein the host is a plant.

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30. A host organism as claimed in <sup>Claim 25</sup> ~~any one of claims 25 to 28~~ wherein the host is a virus pathogenic to insects.

31. A fusion protein as expressed by a host as claimed in claim 27.

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32. A pesticidal composition comprising one or more agents as claimed in <sup>Claim 17</sup> ~~any one of claims 17 to 20~~.

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